

TESTIMONY
OF
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Mr. Chairman and Members of the Subcommittee, it is an honor to appear before you today to discuss section 706 of the Telecommunications Act of 1996 and related bandwidth issues.

Before continuing, I should note that while I serve as President of The Progress & Freedom Foundation, a non-partisan research and educational institution, and also on the faculty of Harvard University's Kennedy School of Government, the views I express are my own and do not necessarily represent those of the Foundation, its board or other staff, nor those of Harvard University or the Kennedy School. I should note that, at the Kennedy School, I teach a course entitled "The Role of Government in the 21st Century," which touches on many of the issues you are considering today. Also, The Progress & Freedom Foundation is dedicated to studying the digital revolution and its implications for public policy, and has spent a good deal of effort during the past year examining issues related to this hearing.

Indeed, since September of last year, the Foundation has undertaken a major study of bandwidth issues. Donald McClellan – who until last week served as a Senior Fellow at the Foundation – has worked closely with me and with our Chairman, Dr. George A. Keyworth, II, in directing this study, and I have attached a copy of a paper he prepared on these issues late last summer. A more extensive study will be released by the Foundation in June of this year.

I would also like to point out that our work in this arena has been informed by an advisory group called the Digital Bandwidth Working Group. Convened by Hewlett-

Packard Chairman Lewis Platt and US West Communications President Solomon Trujillo, this group has included representatives from every major sector of the computing and telecommunications marketplace. A complete list of the individuals who have participated in our two major sessions is the second attachment to my testimony.

Also in this connection, let me reiterate that my remarks today represent my own views only. Neither the individuals participating in the Digital Bandwidth Working Group nor the institutions they represent have endorsed any findings, conclusions or recommendations from our work to date. At the same time, I want to thank all of the individuals and institutions that have participated in this effort – and especially Mssrs. Platt and Trujillo, whose foresight and leadership in convening this effort have been essential.

My testimony today is intended to provide a broad overview of the issues associated with Section 706 of the Telecommunications Act and the need for affordable digital broadband telecommunications services. It makes three broad points:

First, the emergence of a ***new digital economy*** is transforming – for the better – the way we produce wealth in the United States and around the world.

Second, rapid deployment of ***digital broadband networks*** is crucial to the continued health of the new digital economy.

Third, ***the creation of a free market in bandwidth*** is essential to achieve the rapid economic and technological progress the new digital economy demands.

From these points, I will offer some concluding thoughts suggesting a framework for public policy discussions regarding bandwidth issues.

The New Digital Economy

In his 1993 book, *Post-Capitalist Society*, Peter Drucker – the pre-eminent management expert of the 20th Century – stated that "The basic economic resource -- the 'means of production,' to use the economist's term -- is no longer capital, nor natural resources (the economist's 'land') nor 'labor.' *It is and will be knowledge.*" Indeed, Drucker argues, "knowledge is the only meaningful resource today."

These are strong words, but Drucker is by no means alone in reaching such a conclusion. From George Gilder to Alvin Toffler, from Peter Huber to Donald Tapscott, from Steve Forbes to Walter Wriston, thinkers and visionaries have increasingly reached the conclusion that changes in information technology are fundamentally altering our society. James Wolfensohn, President of the World Bank, has endorsed information and knowledge as the most essential tools to hasten the development of lesser developed and developing nations to more prosperous economies.

For some time now (the Tofflers, for example, published *The Third Wave* in 1980) the coming of the new digital economy has been a matter of prediction.

The most important single fact I hope to leave you with today is that the digital economy is no longer something to be discussed in the future tense.

Last week, the U.S. Department of Commerce issued an important new study, *The Emerging Digital Economy*, which bears careful study by all members of this Committee. A few of the conclusions from that study are worth repeating here:

"In recent years, the expansion of the IT [information technology] industries have been responsible for more than one-quarter of real economic growth." Indeed, in 1995, the last year for which figures are available, the information technology industry accounted for 41 percent of overall economic growth.

"In 1996, IT's share [of business investment in new equipment] rose to 45 percent. For some industries . . . IT equipment constitutes over three-quarters of all equipment investment." This figure has been rising steadily since the 1960s, but growth has accelerated significantly since the advent of the commercial Internet in 1993.

"Forrester Research . . . estimated business-to-business transactions [on the Internet] would grow from \$7.8 billion in 1997 to \$326.4 billion in 2002. At the close of 1997, however, a single company, Cisco Systems, was already reporting a run rate of \$3.2 billion in network equipment sales from its Web site." The growth of electronic commerce is literally outrunning the ability of statisticians to measure it.

What is important about these figures is that they are real -- not projections, and not proxies. We are talking about real economic phenomenon, at the very core of today's American commercial system, as reflected in official economic statistics. And, these statistics do not begin to capture the enhanced competitiveness, productivity gains, employment effects and other less direct benefits of the digital boom now underway.

The digital economy is growing rapidly because of the economic benefits it provides to users. The Department of Commerce report discusses in some detail the sources of efficiency gains from digital commerce, from lower transactions costs to more rapid cycle-times and inventory savings. I will not repeat that discussion here. What is important is to recall that the decisions being made to invest in and deploy information technology are private decisions made by independent welfare-maximizing agents in a free-market economy -- that is, they are decisions that can be attributed presumptively to actual or potential gains in economic efficiency.

The Bandwidth Imperative: Deploying Digital Broadband Networks

The single most significant barrier to the continued expansion of the digital economy is the scarcity of digital broadband connectivity to homes and offices.

What do we mean by the words “digital” and “broadband”?

In this context, “digital” means that data in whatever form – audio (e.g. music, telephone conversations), video (moving pictures) or text (written words) – is converted into digital “bytes,” which are then sent over a network, received at the other end, and converted back into a humanly-accessible form. Digital networks are generally “packet-switched,” which means that the data, once converted to digital form, can be broken into packets, which travel to their destination by the most efficient path.

“Broadband” means, simply, that a lot of data can travel in a short period of time. Broadband networks have high carriage capacities, measured in millions of bytes per second (or more). “Narrow-band” networks, by contrast, carry data measured in thousands of bytes per second (or less). Broadband networks can carry the quantities of information now required by the digital economy. Narrow-band networks are simply not adequate.

To quote again from last week’s Department of Commerce report,

A fast/high bandwidth connection can make a vast difference in a person’s willingness to access products and services electronically. An Internet user probably will not spend 46 minutes waiting for a 3.5 minute video clip (approximately the amount of video represented by a 10 megabyte file) to download, but would wait if it took only a minute or a few seconds to download the same file. *Thus, the bandwidth of a consumer’s connection to the Internet is a prime determinant of the products and services that can be delivered electronically.* (Emphasis added.)

Unfortunately, the cost of digital broadband network services to businesses and consumers is prohibitive. A “T-1” connection to the Internet, capable of carrying roughly 1.5 megabytes of data per second (Mbps) today can cost as much as \$2,000 per month or more. Even an ISDN connection, at 128 kilobytes (Kbps) is generally priced at \$60+ per month – a price/quality combination consumers have not found especially attractive. Most consumers, and many businesses, today access the Internet through analog modems working over standard telephone lines – and offering throughputs of 56.6 Kbps under the best of circumstances.

Anyone who has ever waited for a Web page to download over an analog modem knows that 56.6 Kbps – more likely the widely derided “twenty-eight-dot-eight” – is

simply not fast enough for today's Internet applications. And even these speeds often are not realized in practice.

A great deal of energy has been dedicated in recent months to attempting to determine "who to blame" for slowdowns on the Internet. Our research suggests that finger pointing is even less likely than usual to be a useful way of solving this problem.

The reason, simply put, is that the Internet is a seamless web (no pun intended), beginning inside the computer or other receiving appliance and ending at the server from which the information originates. The network is comprised of software as well as hardware, of telephone switches as well as modems, of routers as well as servers – of hard drives, busses, fiber, coaxial cable, fiber optic cable, computer chips and Ethernet boards. Research presented at one meeting of the Digital Broadband Working Group by Hewlett-Packard researcher Gita Gopal demonstrated that all of these components need to work together for high throughput rates to be realized.¹ This is an important point with respect to the issues that will be discussed below.

While all components must work together to achieve the rapid throughputs the digital economy now demands, there can be no doubt that the most pressing issue today is what has become known as "the last mile" problem. The fiber-optic cable that carries Internet backbone traffic is capable of multi-Gigabyte speeds, and the routers and other hardware and software components that make up the backbone are generally capable of delivering much faster throughput than analog modems or even ISDN lines are capable of carrying. For most users, most places, the main barrier to joining the digital revolution is high-speed access to the backbone.

Technological progress has now created technologies that can solve the problem of affordable last-mile access to the Internet.

Much to the surprise of many observers, a new technology known as xDSL recently has made it possible for twisted-pair copper wire connections – the standard telephone wire installed in virtually all homes and businesses – to carry data at rates as high as 8 Mbps. While this technology probably cannot be affordably deployed in all instances,² it is estimated that between 20 and 70 percent of all telephone lines may be amenable to xDSL installation. US West Communications began "rolling out" ADSL services (one form of xDSL service) in Phoenix, Arizona last December.

At the same time, cable modem technology – which allows the high capacity co-axial cable network to be converted into a two-way network and used to deliver high-bandwidth Internet services – has been tested, proven and moved into deployment.

¹ At The Progress & Freedom Foundation, we recently upgraded our computers from Intel Pentium™ 75 Mhz.-based machines to Intel Pentium™266 Mhz. machines, and simultaneously upgraded our network server. We estimate that the result has been to reduce wait-times for access to Web-based materials by an order of magnitude – even though no change was made in our T-1 connection to the Internet.

² To function at full potential, xDSL technology requires relatively short line drops, high-quality copper wires and certain other technical conditions which are not met for a significant proportion of current telephone connections.

The current generation of cable modems are capable of delivering even faster speeds than xDSL – up to 10 Mbps. Cox Communications, TCI's @Home division and other cable firms are already making cable modem technology available to many of their customers.

Satellite services are also capable of offering downstream access to the Internet, and will soon – with the deployment of Teledesic and other low-earth-orbit systems – be capable of offering high-speed two-way services. Currently, one satellite provider offers downstream access at 400 Kbps, with upstream access provided through a standard analog modem attached to a telephone line.

Land-based wireless technologies, though limited today to 28.8 Kbps access, have the potential for 1.5 Mbps access in the near future.

These technologies all lie somewhere between the present and the immediate future. Even those furthest along – xDSL and cable modem technologies – are only now being tested in real markets under real conditions. We know the technologies work, but we know a lot less about robustness, costs, business models and – the most important factor of all, consumer willingness to pay.

What we do know is that both technology and the marketplace are moving very, very fast. Technologies that only recently were “on the drawing board” are now being deployed. The number of Internet connections is doubling every eighteen months, and the amount of traffic appears to be doubling every three months. The private sector appears willing to make very substantial investments in electronic commerce-based enterprises – which account for over 50 percent of all venture capital investments in the United States today.

In short, the communications marketplace is starting to look like the computer marketplace we are all so familiar with. After a century in which the most significant change in point-to-point voice communication was the introduction of touch-tone phones, communications companies are starting to function on “Internet time.”

During the past several months, as we have met with participants in the Digital Broadband Working Group, there have been a number of cathartic moments, in which issues which previously seemed “opaque” suddenly became clear. None was more dramatic, however, than when a small group met to hear a briefing from a computer company representative on the impact of the new “DSL-lite” standard recently agreed to by Compaq, Intel, Microsoft and several local exchange carriers.

To make a long story short, the computer representative explained that the value of the new standard was to make possible immediate deployment of this particular variety of DSL service. “What’s your next step?” asked one of the telephone company personnel in the room, suggesting that various additional approvals and so forth would no doubt be required.

“We expect to have computers [with the new technology] ‘in the stores by Christmas,’” came the reply.

For a communications industry accustomed to 36-month regulatory proceedings, the computer

representative's reply was like being thrown into a pool of freezing water. "In the stores by Christmas" is not part of the communications industry culture. But in a converging environment – in the emerging digital economy – it's going to have to be.

A Free Market for Bandwidth

A recent Wall Street Journal story³ reports on an announcement by a major communications firm. The firm, the story says, "will begin deployment of 'asymmetric digital subscriber line' service, or ADSL, beginning in June, *pending approval by the Federal Communications Commission.*" (Emphasis added.)

While I have no intention of oversimplifying the very complex issues that must be addressed to create a free market for bandwidth, I also want to state at the outset that there is something fundamentally wrong with the phenomenon reported above. The digital economy is exploding, creating enormous benefits. Affordable broadband services like ADSL are urgently needed to support its continued growth. Consumers everywhere complain of inadequate bandwidth. A private firm stands prepared to invest hundreds of millions of dollars to provide a cutting edge service that addresses these needs. And a five-member independent regulatory commission stands in the way. Why?

The answer, of course, is that the telecommunications industry is in the midst of a painful transition from a heavily regulated, perhaps "natural" monopoly, to a competitive industry. The transition, set in motion by the Telecommunications Act of 1996, is going slowly – more slowly than many had hoped. Individual firms, and industries, seek to influence the pace and shape of the transition to achieve competitive advantage. And Congress, when it passed the Telecommunications Act, left more than a few of the details to be decided later.

Much of the debate about the transition represents the continuation of age-old battles. Long-distance telephone companies fear that local exchange carriers will use their customer lists and their control over the "local loop" to compete unfairly for inter-LATA business. Cable television companies worry that regulation will provide unfair advantages to satellite providers of television programming, and broadcasters worry about the growing market share held by cable. Everyone fears that the "universal service" system that subsidizes phone rates for some by levying de facto taxes on others is unsustainable, or simply inconsistent with a competitive environment in which prices presumably would reflect marginal costs.

As new technologies have emerged, new conflicts have emerged with them. Internet Service Providers worry that they may be charged access fees – like long-distance companies – for their use of the local exchange carriers' lines. Qwest and similar companies have added yet another dimension to the debate by offering – sooner than many expected – long distance telephone services that utilize digital broadband networks (i.e. the Internet backbone), and hence bypass much of the existing regulatory structure.

Simply keeping track of the developments in these areas is a full-time job. Wise, considered

³ April 13, 1998, p. B8

decisionmaking often seems impossible.

What should Congress – or the FCC – do about the urgent need for investment in and deployment of digital broadband networks?

The report we at The Progress & Freedom Foundation will issue in June will address this question in great depth. Let me simply suggest some principles.

Principle #1: Communications and computing are converging towards a single marketplace for content, communications and computing, and the current balkanized model of regulation is becoming simply unsustainable. The computer industry has thrived in the United States because the United States government has had the wisdom, by and large, not to try to regulate or control its growth. As regulation adapts to the new realities of the marketplace, the model that should prevail is the computer model.

Principle #2: Every regulation creates a constituency, a set of beneficiaries who have a stake in preserving the regulation. Such constituencies make legitimate arguments that they have relied in good faith on the regulatory environment, have structured their business (or their lives) accordingly, and will suffer from any change. If the end goal is deregulation, therefore, passing new regulations is not a good way to get there.

Principle #3: The Internet is global in nature, and the digital broadband networks growing up to service it are unbounded by traditional geographical lines. Responsibility for moving from a regulated to a market-based environment lies, accordingly, with the Federal government and, eventually, in the Federal government's relations with foreign nations and international governing bodies. It does not lie in statehouses, and certainly does not lie in city halls or county office buildings.

Principle #4: Incumbent providers of both cable television and local telephone service have some market power today by virtue of their control, respectively, of coaxial and copper cable "to the home." While some regulation – such as the existing access and unbundling requirements – makes sense to limit the exercise of this market power, care should be taken that regulations do not limit incentives for new entrants (or incumbents) to invest in facilities needed to provide digital broadband services.

Principle #5: Time is of the essence. For digital broadband networks to evolve at the pace required by the digital economy, they need a stable institutional environment in which all, or almost all, decisions are made without regulatory delay. Internet time and FCC time are measured in different units – one in hours, days and weeks, the other in months and years. The FCC was not designed to make decisions in Internet time. Neither were state public utility commissions, or county boards, or city councils. Only the market can meet the digital economy's "need for speed."

Suggestions for Policymakers

These principles lead directly to some suggestions for action:

First, the FCC should expedite its consideration of the section 706 petitions that have been filed by a number of local exchange carriers. Removing the regulatory impediments that are slowing investment in and deployment of digital broadband networks is an urgent national need that demands immediate attention.

Second, the FCC should construe its role vis-a-vis these petitions broadly. Removing Federal barriers (e.g. Inter-LATA restrictions) that inhibit ILEC efforts to deploy broadband networks may do little to ease impediments and delays that result from state regulations. Similarly, removing impediments to ILEC deployment does nothing to address the regulatory impediments faced by cable television operators deploying the same or similar services.

Third, in examining these issues, the FCC should look carefully at the need to retain existing restrictions, or impose new ones, to inhibit the exercise of monopoly power by ILECs or by cable system incumbents. The goal here should be to create an open competitive environment in which bottleneck facilities are available to all competitors (new entrants as well as incumbents) on an equal basis. What the FCC should not do is try to create the mythical "level playing field" – a market in which no one is allowed to have any advantages at all.

Fourth, and finally, Congress must begin immediately to examine telecommunications policy in light of the emerging digital economy and the rapid convergence of the communications marketplace. Old barriers between industries are breaking down far more rapidly than the Telecommunications Act of 1996 could have envisioned, and the transition to a market-based environment the Act did envision is taking far too long. In the bandwidth arena, this means looking especially at our policies regarding universal service and seeking new approaches that do not have the market distorting effects of the current regime.

Conclusion

Earlier in my testimony, I indicated that there is one fact, above all, that I would ask members of this Subcommittee, to take away: The digital economy is not something that is “coming,” it is not “on the horizon” or “just around the corner.” It is here. It is our economy, today, right now.

Creating a market-based environment for the digital broadband services our economy needs to prosper is perhaps the single most urgent policy issue before this Subcommittee, this Committee, this Congress and this Administration. I applaud you for dedicating your attention to this issue this morning. I urge you, on behalf of every American who likes having the Dow at 9000, the budget deficit at zero and the American economy dominant in the world to continue giving this issue the attention it needs and deserves.

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear today. I look forward to addressing any questions you may have.